# Effectiveness of self-instructional module regarding prevention of ventilator associated pneumonia among paediatric staff nurses in selected hospitals at Bangalore

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**Abstract**

Ventilator Associated Pneumonia (VAP) is one of the most common hospitals acquired infection and is associated with increased mortality rate. Prevention of VAP is very important aspect while caring for mechanically ventilator patient. The nurse's role in prevention of VAP is very significant as they provide care to the critically ill patient round the clock.

This study aims to evaluate the effectiveness of Self-Instructional Module (SIM) on paediatric staff nurses knowledge regarding prevention of Ventilator Associated Pneumonia (VAP) in selected Hospitals at Bangalore.

**Material and Methods:** A Quasi experimental one group pre-test post-test design was adopted. The study was conducted on 40 paediatric staff nurses working in selected hospitals of Bangalore, who were selected by Non probability purposive sampling technique. Data was collected by administering structured knowledge questionnaire. The content validity of the tool was established. The reliability of tool was established by testing the internal consistency by using Test-retest method.

**Results:** Result of study indicate that total among 40 subjects, (67.5%) subjects had moderately adequate level of knowledge regarding ventilator associated pneumonia, (20%) subjects had moderate level of knowledge and only (12.5%) subjects had inadequate knowledge before administration of self-instructional module. Where as in post-test, majority of the subjects (75%) had adequate level of knowledge regarding ventilator associated pneumonia, and (25%) subject had moderately level of knowledge and none has inadequate knowledge after self-instructional module administration. The mean pre-test knowledge score was (14.73) which improved to (22.63) in post-test ($p < 0.001$).

**Conclusion:** Self-instructional module improved the knowledge of pediatric staff nurses regarding ventilator associated pneumonia. Improvement in knowledge was assessed by taking post-test after 7 days. This study concluded that self-instructional module is effective tool to improve the knowledge of staff nurses regarding ventilator associated pneumonia.

**Keywords:** Self-instructional module, ventilator associated pneumonia, knowledge, pediatric staff nurses

## 1. Introduction

Health care-associated infection (HCAI), also referred to as "nosocomial" or "hospital" infection, is defined as: "An infection occurring in a patient during the process of care in a health-care facility which was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff." Such infections include urinary tract infection, ventilator associated pneumonia, surgical site infection and blood stream infection [1].

According to the Centre for Disease Control and Prevention (CDCP), approximately 2 million patients each year develop hospital acquired infections. These infections occur when there is interaction among patients, health care personnel, equipment and bacteria. Hospital acquired infections are preventable if caregivers practice meticulous cleaning and disposal techniques. Standard precautions including the use of gloves, goggles, gown and mask reduce the risk of transmission of pathogens [2].

Ventilator-associated pneumonia (VAP) is defined as nosocomial pneumonia in mechanically ventilated patients, which develops more than 48h after initiation of mechanical ventilation (MV). VAP is divided into early onset VAP that occurs within 5 days of mechanical ventilation and late onset VAP that develops five or more days after initiation of mechanical ventilation [3].

VAP is one of the most common infections acquired by adults and children in ICU, Society for Healthcare Epidemiology of America/Infectious Diseases Society of America report 10%-20% of patients undergoing ventilation in America developed VAP [9]. The frequency of VAP in the ICUs is high and VAP's negative impact on patient outcomes and resource utilization is huge.[8] The hospital-wide prevalence of VAP was 1.7% and 2.9% in studies conducted in Algeria and in Senegal, respectively [4, 5].

The physical strategies for prevention of VAP include: Route of endotracheal intubation, systematic search for maxillary sinusitis, frequency of ventilator circuit changes, airway humidification: type of humidifier, frequency of

humidifier changes, endotracheal suctioning system: Closed vs. open endotracheal suctioning system: Frequency of change, subglottic secretion drainage, timing of tracheostomy and use of bacterial filters [6, 7].

Nevertheless, nurses need to have an awareness of the problem as well as knowledge on its prevention strategies to adhere to such practices. Skilled and knowledgeable nurses are extremely important and needed to make appropriate decisions in patient care and minimize risks to patients. ICU nurses knowledge should bring confidence to make appropriate decisions and prevent poor outcomes in the recovery of mechanically ventilated patients [8].

## 2. Objectives of the study
1) To assess the pretest knowledge score regarding ventilator associated pneumonia among pediatric staff nurses.
2) To assess the effectiveness of the self-instructional module by comparing pre and post knowledge scores among pediatric staff nurses.
3) To find association between pre-test knowledge scores of pediatric staff nurses with their selected demographic variables.

## 3. Hypothesis
All hypotheses are tested at 0.05 level of significance
1) $H_1$- The mean post-test knowledge scores of pediatric staff nurses will be significantly higher than the mean pre-test knowledge scores by paired "t" test at 0.05 levels.
2) $H_2$- There will be significance association between the knowledge scores of pediatric staff nurses regarding ventilator associated pneumonia and the selected demographic variables by chi-square test at 0.05 levels.

## 4. Materials and Methods
**4.1 Research Approach:** Quantitative research approach was used.

**4.2 Research Design:** Quasi experimental one group pre-test post-test design was used.

**4.3 Setting of the Study:** The present study was conducted at selected paediatric wards and intensive care units of selected hospitals of Bangalore.

**4.4 Population:** Paediataric Staff nurses working in Selected Hospitals of Bangalore

**4.5 Sample:** In the present study sample comprised of 40 paediatric Staff nurses of selected hospitals at Bangalore. (Same group of paediatric staff nurses were selected in pre and post test.)

**4.6 Sampling technique:** In the present study Non probability purposive sampling technique was used to select the sample.

**4.7 Development of tool for Data Collection:** The tool for data collection had four sections –Section A, B, C & D.

**4.7.1 Section A:-**Demographic variables like age, gender,

educational status, total years of work experience, total years of experience in paediatric department/intensive care unit, place of residence, monthly income and source of information regarding VAP

**4.7.2 Section B: -** Structured knowledge questionnaire regarding respiratory system had 05 items. The subjects were instructed to tick (√) the correct response. The scoring was done by allotting 1 mark to correct response and then count them.

**4.7.3 Section C: -** Structured knowledge questionnaire regarding ventilator associated pneumonia had 10 items. The subjects were instructed to tick (√) the correct response. The scoring was done by allotting 1 mark to correct response and then count them.

**4.7.4 Section D: -** Structured knowledge questionnaire regarding prevention of ventilator associated pneumonia had 15 items. The subjects were instructed to tick (√) the correct response. The scoring was done by allotting 1 mark to correct response and then count them.

**4.8 Validity of instrument:** The prepared instrument along with objectives, blueprint, and answer key was submitted to panel of experts to establish content validity. These includes: Five nursing experts (senior faculty members) two medical experts and one statistician.

**4.9 Reliability:** The reliability of the tool was calculated by using test-re test method. In order to establish the reliability, tool was administered to 4 Staff nurses in one of selected hospitals at Bangalore. Scores obtained at two different occasions was compared and computed by using Karl Pearson's correlation coefficient.

## 4.10 Data collection procedure
The data collection was scheduled from 5th of April 2016 to 28th of April -2016. Before the data collection, the investigator obtained permission from the selected hospitals, introduced him to the study subjects and explained the purpose of the study. Participants were assured of confidentiality and anonymity.
1) The investigator introduced him to the authority and explained the purpose of the study. All the concerned heads were co-operative along with other staff.
2) 40 paediatric staff nurses were selected from two hospitals (20, 20 samples were collected from N.R.R hospital and Sidvin hospital respectively).
3) The investigator first approached Sidvin hospital. Pre-test was done by using a structured knowledge questionnaire to assess the pre-test knowledge regarding prevention of VAP. Pre-test along with intervention was carried on day 1.It took about 25-30 minutes for each staff to complete the knowledge questionnaire on pre-test.
4) Post test was carried on 7th day by administering the same knowledge questionnaire to the paediatric staff nurses. It took again 25-30 minutes to complete the knowledge questionnaire in post- test.
5) Same procedure was repeated for other selected hospital.

6) Data collected was analyzed and tabulated by using both inferential and descriptive statistics.

## 4.11 Analysis of data
Both descriptive and inferential statistics analyzed on the basis of the objectives and hypotheses of the study. Mean, median, range and standard deviation calculated. Paired test' was used to determine the significant difference between the pre-test and post-test knowledge scores. To determine the association of pre-test knowledge scores with the demographic variables of clients, chi test was used. The findings were interpreted and presented with the help of tables and graphs. The level of significance was set at the conventional level of 0.05% to test the hypotheses.

## 5. Results
The analysed data has been organized and presented in the following sections.

**5.1 Section 1:** Distribution of study subjects according to demographic variables.

**5.2 Section 2:** Distribution of study subjects by their pre-test and post-test knowledge score regarding prevention of ventilator associated pneumonia.

**5.3 Section 3:** Comparison of pre and post-test knowledge score of study subjects regarding prevention of ventilator associated pneumonia.

**5.4 Section 4:** Association of pre-test knowledge score of study subjects with their selected demographic variable.

**Section I: Description of demographic variables of subjects:**
ϖ Out of 40 subjects,
- (58%) were in the age group of 29-32 years, (13%) were in the age group of 21-24 years, 15 % were in the age group of 25-28 years and 15% were in the age group of more than 32 years.
- (90%) were females, whereas only 10% were males.
- (58%) had done GNM, 33% were having B.sc nursing, 10% post basic B.sc nursing and none had post-graduation (MSC nursing).
- (43%) were having 7-9 years of experience, 25% were having 4-6 years, 20% had 9 years and only 13% were having the experience of 0-3 years.
- 53% o had 4-6 years of experience in the pediatrics department/ICU, 28% had 0-3 years, 15% had 7-9 years and only 5% were having the experience of more than 9 years in the pediatrics department/ICU. 95% were from rural areas and only 5 % belonged to urban areas.
- (63%) had monthly income of more than 21,000 Rs, 35% had monthly income of 16000-20,999, 3 % had monthly income of 11000-15,999 and none had monthly income of Rs5000-10,999.
- 53 % had continuing nursing education as their source of information, 25% had journals, 13% had seminars and only 10% had conferences as their source of information regarding prevention of VAP.

**Section II: Assessment of knowledge scores of study subjects regarding prevention of ventilator associated pneumonia before and after implementation of self-instructional module.**
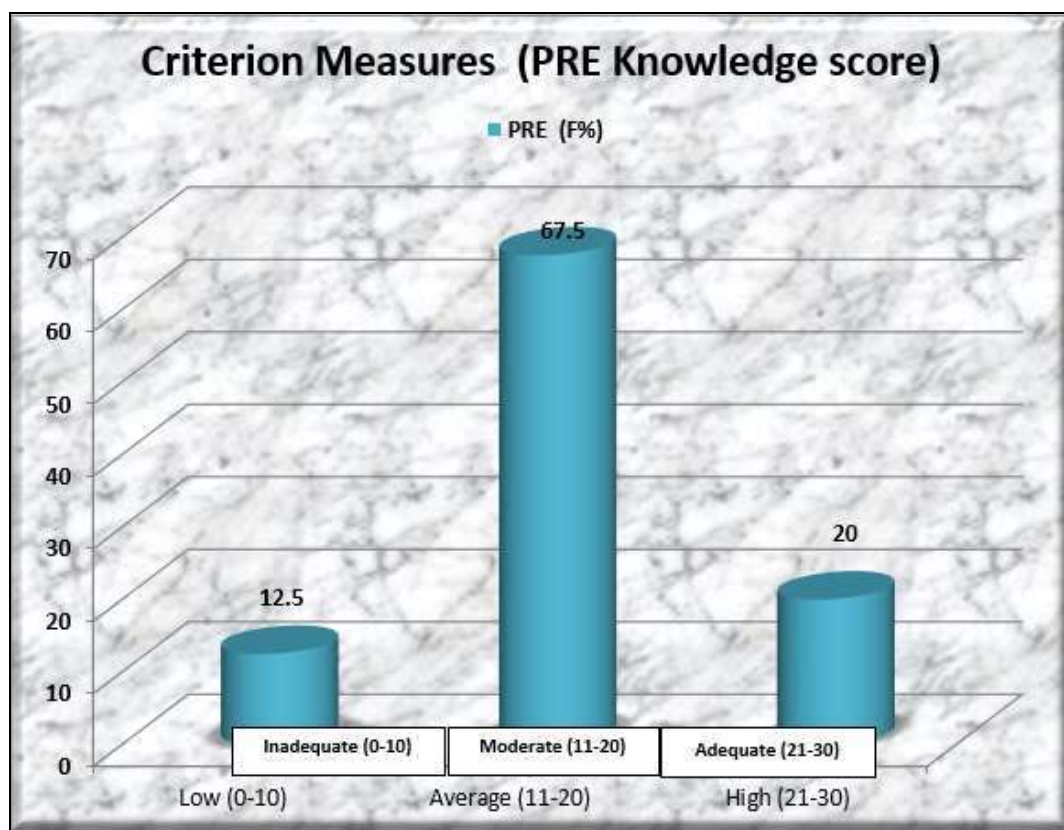


**Fig 1:** Bar Diagram showing Pre- test knowledge score of study subjects on prevention of ventilator associated pneumonia.

The data reveals that in pre-test majority (67.5%) of the study subjects had moderate knowledge, while as (20%) of study subjects had adequate knowledge and (12.5%) of the study subjects had inadequate knowledge regarding prevention of ventilator associated pneumonia.

**Section III: Comparison of pre-test and post-test knowledge scores of study subjects on prevention of ventilator associated pneumonia**

In pre-test majority (67.5%) of the study subjects had moderate knowledge, were as (20%) of the study subjects had adequate knowledge and (12.5%) of the study subjects had inadequate knowledge, were as in post-test majority (75%) of study subjects had adequate knowledge, were as (25%) of the study subjects had moderate and none (0%) of the study subjects had inadequate knowledge. This shows that there is improvement in knowledge after self-instructional module.
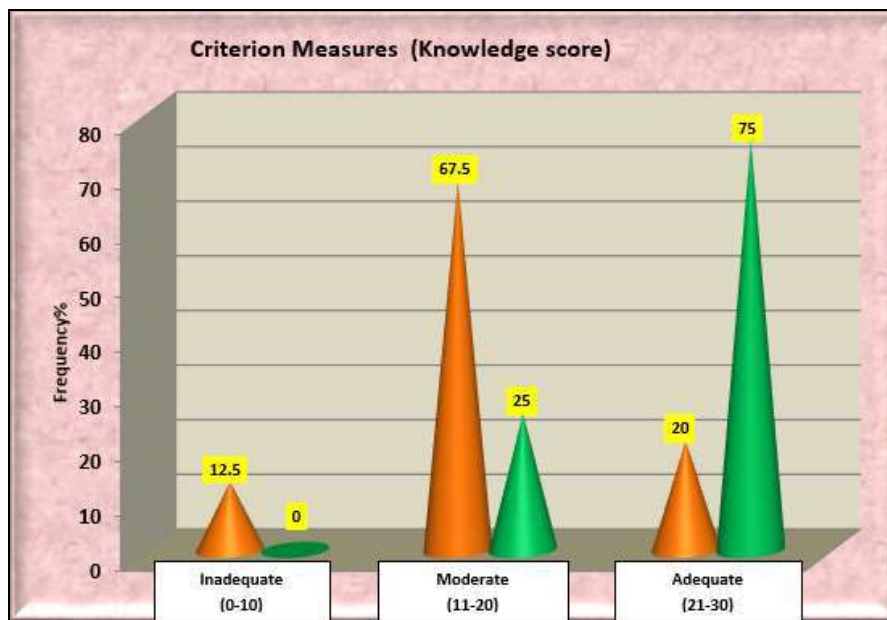


**Fig 2:** Bar diagram shows Percentage distribution of pre-test and post-test knowledge level of study subjects.
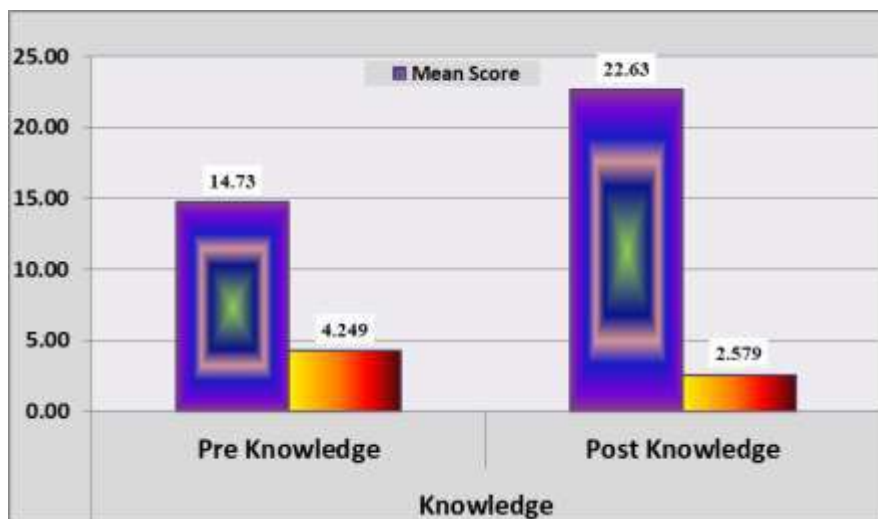


**Fig 3:** Diagram Showing Pre and Post Mean & SD score.

**Section IV: Analysis and interpretation of data to find out an association of pre –test knowledge scores of study subjects regarding prevention of ventilator associated pneumonia with their selected demographic variables.**

**Table 1:** Association of Pre-test Knowledge scores of with selected socio-demographic variables.

| Variables | Opts | High | Average | Low | Chi Test | P Value | df | Table Value | Result |
|---|---|---|---|---|---|---|---|---|---|
| Age in Years | 21-24 | 0 | 0 | 5 | 57.691 | 0.000 | 6 | 12.592 | Significant |
| | 25-28 | 0 | 6 | 0 | | | | | |
| | 29-32 | 3 | 20 | 0 | | | | | |
| | More than 32 | 5 | 1 | 0 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Gender | Male | 0 | 4 | 0 | 2.140 | 0.343 | 2 | 5.991 | Not Significant |
| | Female | 8 | 23 | 5 | | | | | |
| Education | GNM | 6 | 17 | 0 | 12.339 | 0.015 | 4 | 9.488 | Significant |
| | Bsc Nursing | 1 | 7 | 5 | | | | | |
| | Post B.Sc Nursing | 1 | 3 | 0 | | | | | |
| | M.Sc Nursing | 0 | 0 | 0 | | | | | |
| Total Experience | 0-3 years | 0 | 0 | 5 | 80.000 | 0.000 | 6 | 12.592 | Significant |
| | 4-6 years | 0 | 10 | 0 | | | | | |
| | 7-9 years | 0 | 17 | 0 | | | | | |
| | More than 9 years | 8 | 0 | 0 | | | | | |
| Experience in Pediatric Dept./Intensive care Unit | 0-3 years | 0 | 6 | 5 | 33.771 | 0.000 | 6 | 12.592 | Significant |
| | 4-6 years | 2 | 19 | 0 | | | | | |
| | 7-9 years | 4 | 2 | 0 | | | | | |
| | More than 9 years | 2 | 0 | 0 | | | | | |
| Place of Residence | Urban | 0 | 1 | 1 | 2.888 | 0.236 | 2 | 5.991 | Not Significant |
| | Rural | 8 | 26 | 4 | | | | | |
| Monthly Income | 5000-10,999 | 0 | 0 | 0 | 9.488 | 0.050 | 4 | 9.488 | Not Significant |
| | 11000-15,999 | 0 | 1 | 0 | | | | | |
| | 16000-20,999 | 0 | 10 | 4 | | | | | |
| | More than 21,000 | 8 | 16 | 1 | | | | | |
| Source of Information regarding VAP | Continuing Nursing Education | 7 | 14 | 0 | 13.557 | 0.035 | 6 | 12.592 | Significant |
| | Seminars | 0 | 3 | 2 | | | | | |
| | Conferences | 0 | 4 | 0 | | | | | |
| | Journals | 1 | 6 | 3 | | | | | |

## 6. Discussion

While comparing the knowledge scores of subjects regarding ventilator associated pneumonia. The mean post-test knowledge scores ($22.63 \pm 2.579$) of the study subjects on prevention of VAP was significantly higher than that of the mean pre-test knowledge scores ($14.73 \pm 4.249$) $p<0.05$. This indicated that self-instructional module was effective in enhancing the knowledge of paediatric staff nurses regarding prevention of VAP. The study findings are similar to the findings of a study conducted by Stijn, Sonia, Dominique, Paul, and Brigitte to deter-mine ICU nurses knowledge and practice of evidence based practices for the prevention of VAP, the study revealed that only 20% of nurses knew that ventilator circuits should be changed once weekly and only 60% nurses knew that subglottic drainage of secretions would reduce VAP. At the end of the study they concluded that, nurses lack knowledge regarding recommendations for VAP prevention and continuing education would help to improve EBP.[9]

## 7. Conclusion

Knowledge score of staff nurses in different hospitals of Bangalore was found inadequate regarding ventilator associated pneumonia in the pre-test. (67.5%) had moderately adequate level of knowledge regarding ventilator associated pneumonia, (12.5%) of subjects had inadequate level of knowledge and only (20%) of subjects had adequate level of knowledge?

There was evident increase in knowledge score of subjects after the implementation of self-instructional module regarding ventilator associated pneumonia. The mean of pre-test knowledge score was (14.73%) which improved to (22.62%) in post-test ($p<0.001$).

The socio demographic variables Age, Educational Status, Total experience, experience in pediatric wards/icu, source of income were found to have significant association with the pre-test knowledge score whereas, gender, place of residence and monthly income had no association with their pre-test knowledge scores.

Self-instructional module improved the knowledge of staff nurses regarding ventilator associated pneumonia. Improvement in knowledge was assessed by taking post-test after 7 days.

## 8. Acknowledgement

Limitations of the Study:

- As the study was conducted only on 40 paediatric staff nurses which Imposed limits in generalization of findings.
- The study was limited to those paediatric staff nurses who were working in selected hospitals of Bangalore.
- The study was limited to only paediatric staff nurses so it was not generalized to other staff nurses.

## 9. Recommendations

Based on the results of the study, the following recommendations are proposed:

- Manual information booklets and self-instruction modules should be developed by specialists in area of prevention of VAP.
- The hospital administers should put plan for mandatory in-services education and ICU diploma courses in hospital acquired infection, especially VAP.
- The nursing administers should appoint nursing professionals in ICU based on the in-service education obtained on VAP.
- Nursing curriculum should emphasis on strengthening students clinical knowledge regarding various hospital acquired infections (HAI).
- The health service provider should be encouraged to disseminate knowledge by publications and organizing

journal clubs, workshops, seminars, conferences.

- The hospital administers should develop protocols, diagnosis, reporting VAP cases and appropriate treatment of VAP.
- The hospital administer should reinforce the ICU staff to written VAP as formal diagnosis in their follow up sheet and develop form for VAP incidence tracking in the hospitals.

## 10. References

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